

Perspectives and perceptions on the consumption of a healthy diet in Soweto, an urban African community in South Africa

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INTRODUCTION

South Africa is still a complex mixture of both developed and developing areas in terms of its population and its economy, with a variety of living conditions spanning wealthy and middle-income suburbs, deprived peri-urban areas and under-developed rural areas.^(1,2) Urban black South Africans living in Soweto represent a population subset that is undergoing rapid social and economic development.^(3,4)

The South Western Township, later named Soweto, was developed in the proximity of Johannesburg, South Africa, approximately 100 years ago. It is home to the largest number of urban black Africans on the African continent.^(4,5) According to an official census done in 2001, the number of people living in Soweto counted just below 1 million people. This number is rising, as there is a steady influx of migrants.⁽⁶⁾ It is a population in transition, with old squatter misery and new prosperity existing side by side.^(4,5) According to Stewart, et al. (2006), data on the population of Soweto has shown a low prevalence for cardiovascular disease (CVD) and the underlying risk factors.⁽⁴⁾ This might however be changing, as several studies have shown that urbanisation and the nutrition transition in South Africa is accompanied by an increase in the CVD risk factors in black Africans. More data is however needed to determine whether

ABSTRACT

In Soweto, like in many other urban communities in sub-Saharan Africa, rapid urbanisation and epidemiological transition have left this urban African population vulnerable to diseases of lifestyle such as obesity, cardiovascular disease, hypertension and diabetes. The Heart of Soweto (HOS) study was established to examine the emergence of heart disease in Soweto and other African communities in epidemiological transition and found multiple threats to the current and future heart health of Soweto. Food intake data from the HOS has shown damaging food choices and potential nutritional deficiencies in a subgroup of urban black African patients diagnosed with CHF, living in Soweto. This preliminary data focused on the impact of changing dietary patterns, low income levels and a probable lack of knowledge of what constitutes a healthy diet and the contribution of these, to cardiovascular disease.

It seems that the traditional diet is being abandoned in favour of a more Western diet typified by increased consumption of processed and convenience foods, and therefore an increased intake of salt, sugar and saturated fat. The decreased intake of fruit and vegetables has led to a decreased consumption of fibre and vitamins and minerals. The traditional diet is associated with a low prevalence of degenerative diseases, whereas the Western diet is associated with increased prevalence. Factors that might possibly contribute to the change in dietary patterns include socio-economic circumstances, urbanisation, food insecurity, awareness around healthy food choices, as well as perceptions on obesity and overweight.

Our comparison, based on currently available food prices, shows that the consumption of a healthy diet in Soweto represents a more cost effective and affordable choice than an unhealthy diet. Healthy food choices therefore, should be promoted both from a health, as well as a financial perspective.

Creating awareness around risk factors that might contribute to chronic diseases of lifestyle and the prevention thereof, has become essential in this urban African population. Nutrition education and intervention programmes should focus on foods that are varied, available, culturally acceptable and popular, with the emphasis on affordability, as well as being consistent with the South African Food Based Dietary Guidelines. SAHeart 2011; 8:178-183

this increase in CVD risk is related to urbanisation per se or whether socio-economic position influences the nutrition transition and related increase in CVD risk.⁽⁷⁾

The HOS Study is one of the largest and most comprehensive prospective registries on heart disease emanating from Africa to date, and is a collaborative project that was established to examine the emergence of heart disease in Soweto and other African communities in epidemiological transition. According to Sliwa, et al. (2008), data from the HOS provide good evidence that the phenomenon of epidemiologic transition in Soweto, South Africa has broadened the complexity and spectrum of heart disease in this community. We found multiple threats to the current and future heart health of Soweto including a high prevalence of modifiable risk factors for atherosclerotic disease, and a combination of infectious and non-communicable forms of heart disease, with late clinical presentations.⁽⁹⁾

Food intake data from the HOS has shown damaging food choices and potential nutritional deficiencies in a subgroup of urban black African patients diagnosed with CHF, living in Soweto. This preliminary data focused on the impact of changing dietary patterns, low-income levels and a probable lack of knowledge of what constitutes a healthy diet and the contribution of these, to CVD.⁽⁹⁾ The increased intake of processed and convenience foods, that were in the past not part of the local diet, will contribute to the development of newer forms of heart diseases and other chronic diseases of lifestyle, such as diabetes and high blood pressure, especially with relatively young persons and women.^(9,10) Data reported by Feeley (2008) that almost ninety percent of 17-year-olds living in Soweto consume fast foods three or more times per week, support these findings from the HOS.⁽¹¹⁾

A clear need therefore exists in this urban African population to identify the perceptions and possible barriers to the consumption of a healthy diet and to develop and implement targeted, culturally sensitive and economical nutritional programmes.

POSSIBLE CONTRIBUTORS TO UNHEALTHY FOOD CHOICES

Socio-economic circumstances

Data from the HOS reported that the link between socio-economic circumstances and the increase of non-communicable heart disease poses the biggest threat in the Soweto population.⁽¹⁰⁾ Financial security is essential to ensure a regular and adequate supply of a variety of foods, thereby preventing malnutrition (under- and over-nutrition) and reducing the risk of developing chronic diseases of lifestyle.^(1,12) Socio-economic inequities are still present in South Africa and are reflected in the food choices and macro-and micro-nutrient consumption, as well as the nutritional status of people living in South Africa, as well as Soweto.^(1,10)

Data from the HOS has shown a gradient in total cholesterol levels according to educational experience; 3.6 ± 1.4 , 3.7 ± 1.3 , and 4.2 ± 1.5 mmol/L in those with <6, 6-10 years and >10 years education, respectively.⁽¹⁰⁾ This is supported by results from the Transition, Health and Urbanisation Study (THUSA) study that showed, that with urbanisation, increased income and increased education, there were marked and sustained increases in some CAD risk factors, notably total serum and LDL cholesterol levels in men and women, and BMI in men.⁽¹³⁾

Urbanisation

Increased urbanisation in South Africa can be attributed to a change in social structure, political changes in the country, as well as economic factors.^(1,10,14)

We could show recently that less than half of the 5 328 cases screened for cardiovascular disease at the only tertiary clinic for a population of more than 1.1 million were living longer than 5 years in Soweto.⁽¹⁰⁾

With urbanisation new challenges and problems have to be faced together with a possible improvement in economic circumstances. These challenges include living in squatter camps and informal houses with poor sanitation and sewage disposal, water still has to be carried from one central tap, no electricity, no refrigeration and food has to be cooked on paraffin stoves or wood fires, as well as increased exposure to crime and violence.⁽¹⁾

With urbanisation, people have moved away from their families and familiar surroundings with the resultant loss of support structures, as well as having to adjust to a new environment and surroundings. The lifestyle changes that are most frequently observed are an increased sedentary lifestyle and a change in dietary patterns. In rural areas people tend to be more physically active, working in and around their houses, walking to town and to visit friends and children playing outside. In urban areas, transport is more available and shopping centres very accessible and people therefore do not need to walk long distances. Instead of playing sports outside, people stay in to play video games or watch television or sit in front of the computer.⁽¹⁵⁾

In Soweto, as in other parts of the country, urbanisation has impacted negatively on dietary patterns. A more Westernised diet is followed, that is higher in energy, contains more salt, saturated fat and more sugar. The decreased intake of fruit and vegetables has lead to a decreased consumption of fibre and vitamins and minerals.^(1,9,16) In addition, increased alcohol and tobacco consump-

tion is seen.⁽¹⁾ Working longer hours and being away from home for longer periods of time, as well as fast foods being more available and affordable, have led to a change in dietary behaviour.^(1,15) These changes in lifestyle and diet contribute to increasing levels of chronic diseases of lifestyle risk factors.^(1, 9,15)

CAN WESTERN DIETARY GUIDELINES BE APPLIED TO AN URBAN AFRICAN COMMUNITY?

Data from the HOS showed an increased intake of salt as well as saturated and trans fatty acids due to the increased consumption of processed and convenience foods. A tendency still exists to eat fruit, vegetables and salads only on weekends, which leads to a decreased consumption of fruit and vegetables and subsequently to a low micronutrient and fibre intake.⁽⁹⁾

One of the hypotheses supported by rural/urban comparisons of African populations has been that the traditional diet is abandoned, with urban exposure, for a Western diet typified by decreases in carbohydrate and fibre and increases in fat. The traditional diet is associated with a low prevalence of degenerative diseases, whereas the Western diet is associated with increased prevalence.⁽¹⁷⁾

Incorporating cultural preferences and beliefs into recommended dietary guidelines

The South African population consist of a diversity of ethnic and cultural groups with different traditional eating patterns. The white population consumes a typical Western diet, which has high fat (>30% E) intake, low carbohydrate intake (<55% E), low fibre and high free sugar intake (>10%E). The Indian and coloured (mixed ancestry) populations have a similar pattern to the white population, with the addition of certain popular and commonly consumed foods. The black African population on the other hand, has two distinct types of eating patterns. The rural population still follows a very traditional diet, which is high in carbohydrates (>65%E), low in fat (<25%E), low in sugar (<10%E), and moderately high in fibre. Dietary patterns of the black African urban population, however, is changing to a more Westernised diet, with lower carbohydrate (<65%E) and fibre intakes, and higher fat intake (>25%).^(1,9,17)

Previously, guidelines in South Africa were either nutrient-based or aimed only at a population eating a typical Western diet. Motivated by the FAO/WHO initiatives, the Nutrition Society of South Africa (NSSA) decided to form a focus or working group that has since developed positive, affordable, sustainable and culturally sensitive Food Based Dietary Guidelines (FBDGs) to help South Africans over the age of 5 years to choose and adequate but prudent diet.⁽¹⁸⁾

The FBDGs consist of 10 short, clear and simple messages targeted at different ethnic population groups in both rural and urban areas.⁽¹⁸⁾ The guidelines are:

- **Enjoy a variety of foods.**⁽¹⁸⁾ A lack of dietary variety could contribute to low micronutrient intakes, low energy intakes and chronic diseases of lifestyle.^(18,19)
- **Be active.**⁽¹⁸⁾ This guideline is based on the well-established link between physical activity and lowered risk of mortality and morbidity associated with many chronic diseases of lifestyle and is compatible with the increasing focus on healthy lifestyle and habitual physical activity, including household and gardening activities, transport and leisure time.^(18,20)
- **Make starchy foods the basis of most meals.**⁽¹⁸⁾ Unrefined or minimally processed cereals and grains such as maize, wheat, sorghum, oats and rice in the form of porridges, breads, pastas, rice, samp, maize rice, breakfast cereals and other products should be the central or main food, and the rest of the meal planned around this food. The aim of this guideline is to promote an increased intake of carbohydrate-rich foods in those people who have low intakes, and to maintain optimal intakes among those currently eating high-carbohydrate diets.⁽¹⁸⁾
- **Eat plenty of fruit and vegetables.**⁽¹⁸⁾ Fruit and vegetables provide a good source of fibre-rich carbohydrate and additionally supply many cardioprotective nutrients.⁽²¹⁾ These include potassium (lowers blood pressure), folate (can reduce plasma homocysteine), vitamin C and many polyphenolic compounds (with antioxidant activities) and soluble fibre (lowers cholesterol). Green leafy vegetables are also high in magnesium which has also been associated with lower CVD risk. The FBDGs, therefore, recommends an intake of 5 to 8 portions (400 to 600g) of fruit and vegetables daily.^(18,21)
- **Eat dry beans, peas, lentils and soya often.**⁽¹⁸⁾ These foods are an excellent source of soluble fibre and micronutrients and an economical source of plant protein.
- **Meat, fish, chicken, milk and eggs can be eaten every day.**⁽¹⁸⁾ Literature indicates that it is possible, but difficult, to achieve adequate and balanced diets without inclusion of foods from animals. It is, however, very important to choose low-fat products and fats should be used sparingly in the preparation, cooking and serving of these foods. Although expensive, even small amounts will add valuable nutrients, such as calcium, iron, zinc and the essential omega-3 fatty acids, to the diet.⁽²²⁾
- **Eat fats sparingly.**⁽¹⁸⁾ The aim would be to lower fat intakes, especially the intake of saturated fatty acids (SFAs) among

those who follow a typical Western diet high in fat, and to control the fat intake in those following a diet low in fat.⁽²³⁾

- **Use salt sparingly.**⁽¹⁸⁾ Salt should be used sparingly, if at all, at the table and in the preparation of meals, and the intake of processed foods high in salt should be limited.⁽²⁴⁾
- **Drink lots of clean, safe water.**⁽¹⁸⁾ Water is an essential nutrient and the recommended intake is 1ml/kcal energy expenditure for adults. This equates to 2.9l/day for men and 2.2 l/day for women under average conditions. Children require 50% more water per kcal energy expenditure. Water loss occurs via the lungs, sweat glands and kidneys.⁽²⁵⁾
- **If you drink alcohol, drink sensibly.**⁽¹⁸⁾ This guideline seeks to encourage members of the South African population who misuse alcohol, particularly by binge drinking, to engage in "low-risk drinking" or "sensible drinking". "Low-risk drinking" is defined as no more than four units of alcohol per day for men and no more than two units for women, with at least two alcohol-free days per week. Documented beneficial effects of alcohol include the French paradox, and the indication that moderate alcohol intake may reduce the incidence of coronary heart disease by increasing high-density lipoprotein cholesterol concentrations, and favourably modifying platelet and other clotting functions. In addition, sorghum beer, a traditional African beverage, has been found to make positive contributions to dietary intake, particularly when the beer is brewed with sorghum adjunct.⁽²⁶⁾

The FBDGs therefore seek to address such nutritional issues, but compliance with recommendations is not always readily achieved by disadvantaged urban populations. Although South Africa produces enough food for all its inhabitants, and even exports food, many poor households are food insecure, especially in rural areas and in informal housing areas inhabited by people in transition.⁽¹⁸⁾ Barriers to the application of the FBDGs, as cited by South African women, were affordability, availability, household taste preferences, time constraints, traditional/habitual food purchasing and/or preparation methods, and persistent attitudes.⁽²¹⁾

The implications of food security on the consumption of a healthy diet

Poverty and high levels of household food insecurity are therefore the greatest barriers for the majority of people (especially those in rural and urban informal areas) to the application of many of the FBDGs.⁽²¹⁾

Food security is a broad concept which cuts across many dimensions. At its most basic level, it means access to adequate food for a healthy life.⁽²⁷⁾ Poverty continues to be the main factor in household food insecurity. Sufficient, safe and varied food supply can prevent under- and over-nutrition and reduce the risk of chronic disease.

Household food security depends substantially on household income and asset (or wealth) status. A low-income household is more likely to suffer food shortages than a wealthier household. Food expenditure comprises a large share of the spending of poor households, making them relatively more vulnerable to the impacts of food price inflation.⁽²⁷⁾ The 1999 South African National Food Consumption Survey indicated that where household income was less than R12 000 per annum, few foods were found in the house (maize, salt, white sugar, tea, fat/oils, white rice and white bread were most common) and micronutrient intakes were frequently low.^(9,27)

The relationship between a household's food security status and its purchasing power is far from static; it changes over time. All other factors remaining constant, changes in income alter the quantity and quality of foods purchased and consumed. Price movements of food and non-food items also affect the ability to buy food. For example, to cope with rapid food inflation a household could cut its food purchases and adjust its consumption patterns. Typical coping strategies are: buy smaller quantities of food, switch to different types of food, reduce dietary diversity and skip meals. As a large proportion of new jobs in the South African economy are relatively precarious, a household that sits close to the precipice can also be seen as food insecure.⁽²⁷⁾ Therefore, food choices should be evaluated in the context of total lifestyle and living circumstances. In South Africa, socio-economic circumstances have a major influence on food choices and dietary patterns.⁽¹⁸⁾

The implications and perceptions of obesity and overweight

The prevalence of overweight and obesity is very high in South Africans, with 56% of women and 29% of men having a body mass index $\geq 25\text{kg/m}^2$.⁽¹⁵⁾

Our own research from Soweto highlights the very high prevalence of obesity in particular in women. Data collected at 1 311 consecutive patients attending two primary care clinics in Soweto, South Africa showed that amongst 862 women (aged 41 ± 16 years) and 449 men (aged 38 ± 14 years) women were more likely to be obese (42% vs. 14%; or 4.54, 95% CI 3.33 - 5.88).⁽²⁸⁾

Like many other urban communities in sub-Saharan Africa, Soweto is sitting on a time bomb of modifiable risk factors, most notably obesity.⁽²⁹⁾ Again, voluntary community screening at Soweto taxi-ranks showed a markedly higher prevalence of being overweight or obese amongst females. For the ethnic groups, obesity is highest in black women and in white men. According to SADHS data, obesity seems to start at a young age in these women. By the age of 15 to 24 years, 10% of these women were already obese.^(1,30) It has, however, been observed previously in literature that amongst the black African population, obesity is perceived as less of a problem, with less social pressure to lose weight.^(17,31)

A link between obesity and food insecurity has also been established during the last few years in the literature. Food insecurity with hunger has been associated with an increased risk of obesity.⁽¹⁵⁾

Cost of Dietary Intake in Soweto

The likely cost of consuming a healthy diet in Soweto was calculated based on food prices available in July 2011 and compared to current intake that does not adhere to the South African Food Based Dietary Guidelines. As can be seen in Table 1, current food intake requires an expenditure of approximately R18.42 per day. A recommended food intake, where maize meal porridge is supplemented with mabele (coarse), legumes, carrots, spinach, apples,

oranges and full cream milk would require an expenditure of R17.72 per day, and therefore, represents an attractive option both from a financial and health status perspective.⁽²⁸⁾

Many factors affect food choices and methods of food preparation. Poverty, lack of knowledge and social instability in the black population militate against healthy eating being a priority in the minds of township dwellers. The long commuting distances of employed city dwellers frequently result in choices of easy-to-prepare foods and snacks away from home, which are generally refined and high in fat content. Conversely, the more traditionally orientated individuals are frequently the under-employed "newer arrivals", who may have the time to prepare relatively low-cost maize- and legume-based dishes, which have long cooking times. Dietary interventions have to consider these and other factors.⁽¹⁸⁾

CONCLUSION

Food intake data from the HOS shows that urban Africans living in Soweto might be in the early stages of the nutrition transition and that their food choices are affected by urbanisation. Their diets are being supplemented by highly refined carbohydrate sources, such as added sugar, sweets and chocolates, cakes, biscuits and cold drinks, as well as increased fat and salt intake through processed and convenience foods. It also shows a decreased intake of fruit

TABLE 1: Cost of healthy eating compared with habitual intake⁽³²⁾

Current daily intake			Recommended daily intake		
Food item	Weight (g/mL)	Cost (R) ⁽¹⁾		Weight (g/mL)	Cost (R) ⁽¹⁾
Bread	150	2.25	Mabele (coarse)	40	0.30
Margarine	15	0.70	Apple	160	1.77
Polony	30	0.80			
Milk (full cream)	150	1.23	Milk (full cream)	500	4.25
Sugar	15	0.12	Sugar	15	0.12
Maize meal porridge	1 000	4.80	Maize meal porridge	1 000	4.40
			Beans in tomato sauce	90	1.30
Chicken (cooked)	90	3.00	Chicken	90	3.00
			Canola oil	10	0.21
Tomato	45	0.50	Spinach	75	1.25
Apple	160	1.77	Carrots	75	0.72
			Orange	180	0.40
Cold drink	500	3.25			
Total cost:		R18.42			R17.72

⁽¹⁾Based on food prices in Soweto, July 2011.

and vegetables that contributes to a decreased intake of micro-nutrients and fibre.⁽⁹⁾ Whereas the traditional rural diet is low in fat and high in unrefined carbohydrates, vegetables and fruit, consisting mainly of maize porridge with leafy green vegetables, spinach and/or pumpkin with a high consumption of legumes and fruit when available. It is therefore, likely that this changing pattern of dietary consumption can contribute to a pattern of sub-optimal health outcomes and increased risk for the development of chronic diseases of lifestyle.

Creating awareness around risk factors that might contribute to chronic diseases of lifestyle and the prevention thereof, has become essential in this urban African population. Nutrition education and intervention programmes should focus on foods that are varied, available, culturally acceptable and popular, with the emphasis on affordability, as well as being consistent with the South African Food Based Dietary Guidelines.

REFERENCES

1. Steyn K, Fourie J, Temple N. Chronic Diseases of Lifestyle in South Africa. Chronic Diseases of Lifestyle in South Africa: 1995-2005. South African Medical Research Council, Cape Town, South Africa. 2006;9-21.
2. Gersh BJ, Sliwa K, Mayosi BM, et al. 2010. Novel therapeutic concepts. The epidemic of cardiovascular disease in the developing and global world: global implications. *Eur Heart J* 2010;31:642-648B.
3. Yusuf S, Reddy S, Ôunpuu S, et al. Global burden of cardiovascular Diseases: Part I: General Considerations, the Epidemiologic Transition, Risk Factors, and Impact of Urbanisation. *Circulation* 2001;104:2746-2753.
4. Stewart S, Wilkinson D, Becker A, et al. Mapping the emergence of heart disease in a black, urban population in Africa: The Heart of Soweto Study. *Int J Cardiol* 2006;108:101-108.
5. Johannesburg Metropolitan Council. Soweto, 2009. URL: <http://www.soweto.co.za>.
6. Statistics South Africa. Mid-year population estimates 2009. Statistics SA, Pretoria, 2009. URL: <http://www.statssa.gov.za>.
7. Vorster HH, Kruger A, Venter CS, et al. Cardiovascular disease risk factors and socio-economic position of Africans in transition: the THUSA study. *CVJA* 2007;18(5):282-289.
8. Sliwa K, Wilkinson D, Hansen C, et al. Spectrum of heart disease and risk factors in a black urban population in South Africa (the Heart of Soweto Study): a cohort study. *Lancet* 2008;371:915-922.
9. Pretorius S, Sliwa K, Ruf V et al. Feeding the emergence of advanced heart disease in Soweto: A nutritional survey of black African patients with heart failure. *CVJA* 2011; e-publication.
10. Stewart S, Carrington M, Pretorius S, et al. Standing at the crossroads between new and historically prevalent heart disease: Effects of migration and socio-economic factors in the Heart of Soweto cohort study. *European Heart Journal* 2010;32:492-489.
11. Feeley A. Soweto teens live on fast foods. Nutrition Congress, Pretoria, 2008.
12. Vorster HH, Kruger. Poverty, malnutrition, underdevelopment and cardiovascular disease: a South African perspective. *CVJA* 2007;18(5):321-324.
13. Vorster HH, Kruger A, Venter CS, et al. Cardiovascular disease risk factors and socio-economic position of Africans in transition: the THUSA study. *CVJA* 2007;18(5):282-289.
14. WHO/FAO Expert Consultation. Diet, Nutrition and the prevention of chronic disease, Technical report series, no. 916, World Health Organisation, Geneva, Switzerland. 2003.
15. Steyn NP. Nutrition and chronic diseases of lifestyle in South Africa. Chronic Diseases of Lifestyle in South Africa: 1995-2005. South African Medical Research Council, Cape Town, South Africa. 2006;33-47.
16. Bourne LT, Steyn K. Rural/urban nutrition-related differentials among adult population groups in South Africa, with special emphasis on the black population. *SA J Clin Nutr* 2000;13(1).
17. Bourne LT, Lambert EV, Steyn K. Where does the black population of South Africa stand on the nutrition transition? *Public Health Nutrition* 2002;5(1): 157-162.
18. Vorster HH, Love P, Browne C. Development of Food-Based Dietary Guidelines for South Africa – The Process. *SAJCN* 2001;14(3):S3-S6.
19. Maunder EMW, Matji J, Hlatshwayo-Molea T. Enjoy a variety of foods – difficult but necessary in developing countries. *SAJCN* 2001;14:57-S11.
20. Lambert EV, Bohlmann I, Kolbe-Alexander T. "Be active" – Physical activity for health in South Africa. *SAJN* 2001;14(3):S12-S16.
21. Love P, Sayed N. Eat plenty of vegetables and fruits everyday. *SAJCN* 2001;14: S24-S32.
22. Scholtz SC, Vorster HH (junior), Matshego L, et al. Foods from animals can be eaten every day – not a conundrum! *SAJCN* 2001;14:S39-S47.
23. Wolmarans P, Oosthuizen W. Eat fats sparingly – implications for health and disease. *SAJCN* 2001;14:S48-S55.
24. Charlton KE, Jooste PL. Eat salt sparingly – sprinkle, don't shake! *SAJCN* 2001; 14:S55-S64.
25. Bourne LT, Seager JR. Water-the neglected nutrient. *SAJCN* 2001;14:S64-S70.
26. Van Heerden IV, Parry CDH. If you drink alcohol, drink sensibly. *SAJCN* 2001;14:S71-S77.
27. Jacobs PT. The status of household food security targets in South Africa. *Agrekon* 2009; 48 (4): 410-433.
28. Stewart S, Carrington M, Pretorius S, et al. Elevated risk factors but low burden of heart disease in urban African primary care patients: A fundamental role for primary prevention. *Int J Cardiol* IJC-D-11-00024;2011.
29. Tibazarwa K, Ntyintyane L, Sliwa K, et al. A time bomb of cardiovascular risk factors in South Africa: results from the Heart of Soweto Study "Heart Awareness Days". *Int J Cardiol* 2009;132:233-239.
30. Department of Health, Medical Research Council, OrcMacro. South Africa. Demographic and Health Survey 2003. Pretoria: Department of Health.2007.
31. Dolman RC, Stonehouse W, Van't Riet H, et al. Beliefs of South Africans regarding food and cardiovascular health. *Public Health Nutrition* 2007.
32. Pretorius S, Stewart S, Ruf V, et al. Food choices and their nutritional value in black African patients with heart failure: How affordable is a healthy diet? *SA Heart Congress*, Sun City, 2008.